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Rich Design Research Space

Abstract

This paper introduces and discusses a Rich Research Space as an inclusive methodological framework and scaffold for research-by-design. The Rich Research Space especially addresses the issue of richness in design processes and design-led research. There is a general trend towards increased complexity in design processes, caused on one hand by the increasing depth and width in the use of design media and methods, and on the other hand by the increasing complexity and interdependency of society due to globalisation. These issues confront the designer-researcher with new challenges. This paper formulates a research strategy for research-by-design in fields that have a high degree of richness in the use of media, the amount of information, and the methods involved. The Rich Research Space concept proposed takes into account the physical, social, and cultural spaces, and the virtual and visual media spaces in which the research-by-design takes place. The concept takes the form of a specific integral approach to design, and a holistic theoretical mindset. It embraces many types of investigation, from analytical to intuitive. The Rich Research Space provides a flexible framework within which the complexity of research-by-design can be interrelated, discussed, and reflected upon. Potentially, it can create a more involved role for the designer-researcher, a role that allows contributions towards the resolution of ever more pressing issues in our society. This approach is currently one of a limited number of possible frameworks that the design professions can utilize in order to make a difference in a world of at times overwhelming complexity. The concept of the Rich Research Space is discussed with reference to an art installation called Barely.

Keywords: Research by design, collaborative design, complexity, creativity, research methods.

Introduction

The main objective of this paper is to *introduce* and discuss a Rich Research Space for research-by-design. Research-by-design means research in which design practice plays a crucial role. It is a generative form of research that seeks new results and solutions that can therefore not be addressed in descriptive research but is instead informed by practice and inflected with critique (for an extensive mapping of practice-led design, see the AHRC research review (Rust, Mottram, & Till, 2007). Practice-led research into creative practices confronts the practitioner-researcher with fuzzy and complex research tasks. Complexity is understood in this context in a systemic way, as many inter-related elements playing out on a large field, where the prediction and consequences of actions become difficult or impossible. Design projects frequently involve a large number of stakeholders, requirements, conditions, and implications, all of which interact in complex and contradicting ways. Researching the interactions and negotiations in such practices in a reductive fashion has its limitations.

The concept of the Rich Research Space is put forward here as a means of facilitating inclusive, practice-led research into design practices. The concept seeks to include, absorb, visualise, contextualize, process, and reflect a large number of elements; formal, spatial, social, economical, ecological and technological, through the use of design. The means of design include manifold media representations. The intention is to keep more issues at play than usual so that patterns of activity and interaction can be made explicit, and new concepts and skills for creative research-driven design practices can be generated.

The concept of the Rich Research Space is based on the following:

- The convergence between advanced design processes and research-by-design that is currently found in the academic realm of design universities, and in innovation and research-oriented design practices.
- The position that the complex design task demands an equally rich and non-reductive design process. To develop and understand such a process, we need an equally complex model for research-by-design. This is partly based on the *Richness Imperative* introduced by Trevino et. Al (1990).
- Complex models require an increasing attention to the research space, that describes the total technological, virtual, physical, and social space in which research-by-design unfolds.

The concept of the Rich Research Space includes the physical space of the design studio or research environment, the multiples of digital and analogue design media, the virtual information space, and the social, cultural and aesthetic spaces. The aim is to engage a holistic research approach and to nurture it as a skill rather than a method. The word 'skill' is used here as keeping a large amount of issues in play and synthesising them can only rudimentarily be described as a method; the practice of such, needs to be learned as a skill or tacit knowledge. 'Method' is here understood as the externalized prescription of actions whereas the concept is intended not as a prescriptive formula, but as a scaffold for knowledge construction.

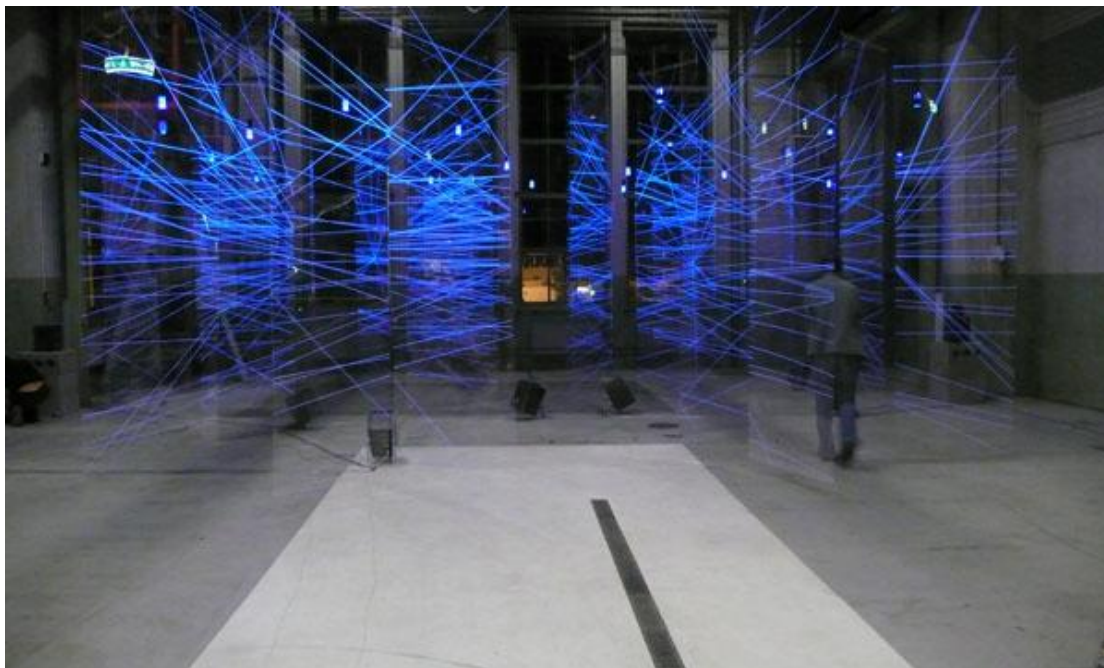
The Rich Research Space embraces and reflects the complexity of the task. It expands itself to the real sites, and engages stakeholders and users. It involves field actions, bringing design media to the site, and acknowledging the importance of the space where design research takes place. The Rich Research Space embraces and embeds design practice into research and research into design practice. It helps to bridge the gap between practice and theory. Although the Rich Research Space includes descriptive and explorative modes of knowledge production, its main end is a generative mode of research. It is designed for the invention and production of new design responses to very complex problems. This dynamic Rich Research Space enables the switching between research modes, between exploration, reflection, generative work, and description. It also allows switching between different areas of the research space; from the studio to outdoors, and from the digital to the physical model. These switching moments are looked upon as special opportunities for reflexivity that will move the process forward. An important point here is that the switch in itself is an accelerating event. Importantly, it is also a critical juncture for reflection.

While the singular elements of the Rich Research Space are well known, what is new here is the more advanced and conscious interlinking of these elements. So too is the connection of elements from the design studio with those from the research realm an addition. The different perspectives, research modes, and practices are linked together in two ways:

- Through the translation of design and research data from one representation to the other. This process naturally generates the switches.
- Through a critical reflexive discourse, activating feedback loops between research practice and reflection. Such discourse is often simultaneous to practice, but also retrospective, looking back at the activities from a distance.

In this article, the concept of the Rich Research Space is discussed with reference to an art installation called *Barely* conceived and design by the author in collaboration with the composer Natasha Barrett and the design research network OCEAN. This is positioning the author within research-by-design and the article is written from the perspective of the designer researcher. This installation, its conception, construction, completion, and use allow

us to investigate the concept of the Rich Research Space within a practical context. In referring to this work, the analytical focus is not on the installation as a work of art but as a heuristic for investigating and discussing further the concept of a Rich Research Space.



BARELY sound active installation, Kanonhallen, Ultima Festival 2007, Natasha Barrett and Birger Sevaldson with OCEAN.

Design Space and Research Space

The concept of a *Research Space* is derived from the term *Design Space*, a term used by, amongst others, Thomas Leerberg (2004) and Giaccardi et. al. (2008). The latter use the term *multidimensional design space*. Design Space, as it is used here, designates the entire setting; spatial, technological, cultural, social, and media-wise, in which the design process takes place. The theoretical inspiration comes from cognitive creativity research, where the importance of the domain (the near field around the individual) is emphasised (Mayer, 1999). Actor Network Theory (ANT) propounds the idea that the “space” in which a research process takes place is of importance. It posits that social networks are built and rebuilt dynamically, and consist of both human and non-human actors. It maps relations that are material or semiotic, involving people, and their ideas and technologies, which together constitute the whole network of relations (Latour, 2005). Certain notions are also drawn from Activity theory as it relates to the production of “tools” through interaction and learning-by-expansion (Engeström, 1999). The Rich Research Space is a “tool” or a meta-tool for research-by-design. However, the understanding of “tools” is here more abstract and generative than in e.g. the work of Fjeld et. al. (2002), where “tools” are looked upon quite literally. The Rich Research Space is here regarded as a complex and manifold tool that will enable an inclusive and complex research process.

The design process that is used to deal with very complex tasks needs to be holistic, detailed, intuitive, knowledge-driven, iterative, and tacit. It should deal with both quantitative and qualitative information. Regarding the nature of the complex design process, the most pressing question is how we can derive knowledge from, through, and by the design process without fragmenting it. Breaking a problem into smaller elements to enhance understanding can be most productive as long as the overview of the context and interplay between those

fragments is maintained. The suggested concept is a means by which to move between holistic and fragmented approaches. This becomes ever more important as the design process increases in complexity due to the interrelated growth of:

- Globalisation: Production environments are more interlinked across national borders and cultures, and the consequences of our actions have wider-reaching environmental, economic, and political impacts.
- Information Technology: The new media make the design process more multi-faceted and complex. New techniques do not automatically replace older techniques but old and new techniques are used together (with the regretful exception of the loss of the drafting table).

The concept of the Design Space is intended to embrace these increasingly complex conditions.

To derive the concept of the Rich Research Space from and by the design space, we need to include elements of reflexivity, generalisation, theory building, and communication through reflections and the externalisation of results. In the Rich Research Space, design investigations are combined with cycles of observation, registration, and reflection. Reflection aims at a holistic and intuitive synthesis. It alternates between the analysis of particular design actions, and an understanding of how they are situated in a larger field. It shifts between post-rationalisation and conceptual forecasting. It feeds from practice and into practice. The different research activities, design, and reflection, can be sequential or parallel. They can be interrelated in different ways or they can be quite independent and feed into each other at certain points.

The maintenance of several layers in the design process requires open planning, tolerance of ambiguity, maintaining multiple models over long periods, and thereby reducing the need for coordination (Boland & Collopy, 2004). Synthesis is often an individual process or limited to a few people. Gehri (ibid. 2004) and others, including the artist Paul Kaiser (2004), who worked frequently with the choreographer Merce Cunningham, have described how intense coordination of collaborations can result in a loss of intensity in a project. The need to reach a common ground for interpretation is growing as projects grow in complexity and the number of partners increases. The efforts put into coordination can dilute, delay or even destroy a project. The Rich Research Space provides a means of generating a shared “image” of the design and research process. At the same time, it allows uncoordinated threads to be maintained over longer periods. It lessens the energy put into coordination and encourages individual interpretation by maintaining a common feel, ambiance, and image of the project that is more detailed, visual, “tasteful”, and “aromatic” than would be the case in a coordination based on a formal agreement. Coordination is thus performed in synergy with design. The social dynamics of the Rich Research Space allow the design process to move between large scale group work, and small group or individual synthesising and decision making (Sevaldson, 2008).

There is a blurred boundary between design and research-by-design, as there is between the concepts of the Design Space and the Rich Research Space. To distinguish research-by-design from the innovative design investigation, the product of research is the externalised and generalized communication of knowledge. In the design process, the design product is the result. These two modes can easily be combined when dual intentions are followed through, as shown in the case of *Barely*.

Media-Rich Design Processes and How to Research Them

The concept suggested in this paper borrows ideas from *Media Richness Theory (MRT)*. MRT was suggested by Daft and Lengel (1984) and proposes that,

...task performance will be improved when task information processing requirements are matched with a medium's ability to convey information richness. A lean medium (e.g. a memo) is sufficient to exchange an unequivocal message (e.g. a routine communication), while a rich medium (e.g. face-to-face meeting) is recommended to resolve an equivocal situation (e.g. negotiation). (Suh, 1998)

Suh's (1998) study did not find any support for the concepts presented in MRT and was critical of the approach. Generally, the theory is criticized for failing to take situational conditions, such as social factors, into account. There is also a criticism of the methods used to measure performance. However, MRT is valuable for having highlighted the relation between information richness and the media used to communicate it. This is highly relevant to the design process. The handling and communication of information is central to the design process, both between participants and stakeholders, but also on the individual level at which the designer communicates with the design space.

If we move the focus from information communication to information generation, the idea of media influencing the process becomes even more valid. The design process is media-based and media-dependent. There is valid evidence that the medium influences the design process. McLuhan (1964) has discussed the influence of media on culture in general, while McCullough (1996) has considered its influence on design in particular. Both Allen (1999), and Lynn (1999) have demonstrated how media is intertwined with new thinking in design. The importance of media richness in the design process has become more evident over the last few decades, as digital media has changed the way we work.

The MRT approach compares singular media in communication. The design process normally engages several media in sequences or parallel. A normal product design process could begin with hand-drawn sketches and continue with e.g. 3D CAD. A video production would start with texts, hand-drawn sketches, and storyboards, and continue with 3D animation tools and, finally, digital video editing. Such a production involves numerous forms of interaction and communication including face-to-face meetings with visualisations and physical models involved, distant collaboration using video conferencing, email, telephones, and file transfers. Very often, the different media overlap and users jump back and forth between them. A typical CAD process amongst advanced design students involves a range of different 3D applications, each selected for its utility in special tasks (modelling, animation, rendering, parametric design etc). These jumps and switches between media are not only becoming more normal, but can be beneficial and increase the capacity for handling very complex design problems, and finding solutions when the process gets stuck (Sevaldson, 2005). The jumps between media and representations and shifts in social constellations transform the design information, its reading and interpretation, and lead to new perspectives that open up and presenting new solutions. More complex design tasks need more multiple, mixed readings and interpretations that accumulate and result in a deeper understanding of the task. The creative process, from generation to synthesis is partly an explicit reflexive discourse and partly a tacit or intuitive one, based on a synthesized and holistic understanding of the task. The ability to generate a rich and manifold understanding from which to synthesize is developed as a skill that goes beyond explicit prescriptions and methods. The concept of the Rich Design Space is designed to support the skill of synthesising.

A design project can address and involves a multitude of parameters, a dynamic network of stakeholders with diverging interests, different environmental requirements, both regarding performance during life-time and sustainable production and recycling, cultural

implications, universal design aspects, and communication aspects. Such a project would benefit from the implementation of a wide range of design media, such as hand-drawn sketches, different 3D-design packages, text, video, design manuals, physical mock-ups, RP-models, simulations, social networking, and different research modes such as participatory research, action-based activities etc. To research this process necessitates equally rich and diversified tools and methods. It also places considerable demand on their interrelations and co-ordination.

Some of the mentioned aspects are social and collaborative issues in which the media aspect risks being overshadowed by other aspects (as mentioned by Suh). However, the concept of the design space for a design process is mainly media driven, although the term includes social interaction and possibly the physical space of the design studio. It is impossible to draw a sharp line between the media and e.g. the social aspect, because these are closely intertwined. A participatory design process is heavily dependent on media since not all partakers are design professionals and will thus have a limited ability to visualize design suggestions. Even collaborations between professionals in product development are heavily dependent upon the use of media that ensures a common understanding. Capjon (2004) has suggested the use of Rapid Prototyping models and other physical representations as especially well suited to design collaboration. From this perspective, MRT has only a very limited and fragmented understanding of “media”, while we here expand the term to include all information-carrying elements, including the physical spaces and human networks.

This approach leads to an increased requirement that the designer manage more actors and interactions in an increasingly complex field. This more advanced role of the designer has much in common with concepts presented in recent System theory in the fields of management and organization. The new profession of “System Architect” (some also use the term “architecting”) refers to individuals operating on the same level as the Project Manager in very complex engineering projects. This role has arisen out of a change in management strategies to deal more intensely with complexity (Størdal, 2003). While project managers maintain a fragmented overview of projects, dealing with linear structures, maintaining a vertical hierarchical information flow, and using deductive decision-making and logistics, system architects work holistically, with informal social structures, maintaining a global overview and a horizontal (informal) information flow. System architecting is generally synthesis-based and inductive, it is dynamic and generative (Christensen, 2006; Rechten, 1999; Stacey, 2007). Interestingly, both system architecting and a more traditional planning approach are seen as equally important and these two roles work in synergy and on an equal basis. The roles can be compared to the role of the traditional engineer and that of the designer. The roles and the cultural backgrounds of these two professions map well onto the roles of the project manager and the system architect. However, this implies that the designer must take on a greater level of responsibility than normal.

As the design process grows more complex and media-rich, the need for new approaches to research-by-design into and by such processes becomes apparent. Although there is great deal of emphasis on reflection in this approach, such a research process opposes the traditional phasing into analyses and synthesis. This is a position theoretically argued for by Gedenryd (1998). In contrast, such a design process generates its own empirical material from which reflections simultaneously arise but, importantly, through a critical reflexive stance and analysis.

The Question of Rigour

The complex research by and into design that is needed to address such complex problems naturally leads to judgements and interpretations becoming the basis for reflection. This has led some to question the rigour of such processes. The main difficulty lays in the distinction

between rigour and rigidity, which are not synonymous. Rigour is, in this case, synonymous with thoroughness. It means that the research process can remain flexible, adaptive, and generative, while rigorous in its reflection and communication. Biggs and Büchler (2007) have argued for similar perspectives.

Convergence

The convergence of the *design process* with the *process of research* is apparent in the emergence of *research-by-design*, although research-by-design is still at an immature stage of development. Generative design processes are regarded as problematic in the design-research realm. There is very little accumulated and communicated experience of how to implement such processes in a practice-led research design. As an example, the report *Practice-led Research in Art, Design and Architecture* draws attention to the problem, but is unable to move the issue forward (Rust et al., 2007). A seamless integration of practice and research, and a particular description of the possible relations between the two remain undeveloped. The Rust et al. report is indicative of the distance between research and practice that remains in the field. These are problems that should be possible to solve, given that qualitative research is well established in other fields, and that in and through practice we are already engaged in such activities. Grounded Theory (Glaser & Strauss, 1967), for example, demonstrates how knowledge and theory can be derived from a material along an inductive process. This means that instead of looking at the material with theoretical preconceptions, theory is built from observations and registrations. This material could be, in the case of the designer-researcher, her or his own generative design practice. Though Grounded Theory is criticised for its categorization, and because of its belief in disregarding preconceived perspectives when approaching a new field of research, it nevertheless shows a systematic way of building theory from within a practice. Here it is used as a reference for underpinning a particular way of thinking when it comes to theory building from within practice. There are obvious problems in research from within practice, but also opportunities. The insider perspective produces severe challenges to research methods. The awareness of, and possible responses to, such problems have been addressed earlier. (Robson, 1993) There are other approaches and many issues and theoretical implications remain to be fully explored, but this demonstrates that a coexistence of practice and theorizing is possible and the relations between them are negotiable.

On the other hand, theorizing can be regarded as a form of practice not unlike e.g. a design practice. Theory building involves a range of activities in putting together investigations and reflections to form a convincing argument. It is built, to a large degree, on judgment and common sense (Giere, 1991). Recognizing this design-like aspect of scientific reasoning should make the relating and interweaving of practice research and theory easier. Within this perspective, it is possible to imagine a selective transition of certain types of design projects into research-by-design projects by including systematic reflexivity and theory building

In project-based research-by-design, media-rich design exploration is complemented by other activities that are undertaken in parallel or sequentially. These can be design experiments, literary reviews, case studies of similar processes, note-taking and sketching, peer disseminations, user interviews, tests, and reflexive discourse. In this way, the research topic may be switched between different media and representations. A complex research design is not new. Earlier I have suggested such an approach in design research in relation to the research of creative use of digital design tools (Sevaldson, 1999, 2000).

Robert Yin (1993) suggests in his methodology for case studies that several research methods be applied in order to cast light on the subject of investigation from different perspectives. The different approaches are then compared and related in what he calls

triangulation. Regarding a research design that heavily depends on knowledge generated through a design activity, it is feasible that a similarly complex approach to design research would be useful. The difference to Yin's case study approach is that the research activities and their relations to one another are different to those in the Rich Research Space approach. The Rich Research Space approach is about compiling the different media approaches and other elements into a gestalt in a similar fashion to the approach utilized by "system architecture". Skjulstad (2007) has suggested something similar in analysing websites as media rich environments.

Reflection, discourse and reasoning are the tools used to build, analyze, and communicate the explicit results from this holistic perspective.

The Case

The Rich Research Space approach will be discussed through a review of the case of the multidisciplinary installation *Barely 1*. The installation was produced by the author and the composer Natasha Barrett in collaboration with the OCEAN design research network (OCEAN, 2008). *Barely* was simultaneously an art installation, a laboratory for research into sound art, and a laboratory for basic research-by-design for the development of new spatial principals. The subject of investigation was the concept of very low sensory stimuli that would be just above the level of perception, a concept introduced by the composer Natasha Barrett, who initiated the concept and was a partner in the project,

Barely is a paradigm of composition, sound-art and multi-media that creates a highly detailed, just perceptual layer above the 'experienced threshold' of our senses; in both the immediate 'real-time' substance and in a temporal context of structure and syntax. The complexity of our everyday stimuli tends to a state of noise - not only in terms of sound but also in all information received by our senses. The *Barely* paradigm explores reality and presents an alternative organisation of this complexity. It entices the individual into deep attention, concentration and sensual experience by offering detail at a level that is only just perceptual, enhancing what is already present in both the individual and the location of the work, rather than attempting to introduce the artificial. In terms of both substance and concept, *Barely* can be regarded as the antithesis to noise (Barrett & Sevaldson, 2007).

Though operating within the contemporary sound art genre, it was regarded, for our purposes, as a full-scale spatial-environmental experiment, within which we had a clear intention to provoke and trigger certain behaviour in the audience. The hope was that the audience would, without prompting, fall into a mode of tranquillity and concentration, become very silent, experience a sharpening of the senses, and eventually enter a state of meditative calmness. This was our main concept for the installation.

Barely explored this idea in a public space, in the form of an installation at Kanonhallen in Oslo, during the Ultima festival of contemporary music (Ultima,2007). The project and its presentation here show how a design space translates into a research space (convergence) through a clearly stated research concept and the adoption of a perspective that views the installation as an experiment.

Building the Research Space

In the *Barely* project, the final installation and its construction can be looked upon as a Rich Research Space; however, the construction of the installation can be regarded as the embedded design process. Although the task and goals were clearly formulated from the start, and the effects were partially demonstrated by sound samples, the resulting space and final soundscape were still to be designed. The 'how' question was unresolved and could only be answered by design. The design process was hence regarded as research into how a space can

be designed that produces the effects described above. The process was highly iterative and sometimes lost focus and took detours, demonstrating the nature of this type of research and the value of processes that have no set format or even a preconception of a solution. It is clear that there are probably thousands of possible solutions to this problem.

How could we make a space that, despite the existing visual and audio influences from the surroundings, would lead to a change of behaviour among visitors towards silent tranquillity? Obviously, this was not a question to be answered by simple prescriptions, but one that required a working design solution. This meant that this knowledge could only be generated through research-by-design. Therefore, we will next consider the design process, the research space, and how the switches in the process led to the final result.

The Process

The design was a tentative process, in which initial visualisation was followed by a great deal of collective experimentation and material tests and later, by individual modelling and decision-making. It was built around a partly distant collaboration that was more important in the mid-phases than in the beginning and final decision-making, detailed design, and construction phases. Nevertheless, these phases were important to hone in on the solutions, investigate possibilities, and exclude concepts. The investigated concepts included projections onto plastic sheets, different highly transparent textiles creating moiré patterns, and membranes that were highly transparent and thus worked more as spatial elements than surfaces. During this process, the concepts also moved from the creation of local effects, e.g. with projections, towards the creation of global spatial configurations, e.g. with highly transparent foils.

As mentioned earlier, switches between different modes of design, different design media, and in the configuration of the collaborating group are regarded as especially valuable moments in the process. There were two important switches in the design process of *Barely*.

Initially, we exchanged ideas about the imagined effects. One early concept was the “predator effect” (from the *Predator* movies), a barely recognisable disturbance of the air. Needless to say, imagining the realisation of such effects without including additional disturbing elements, such as large, noisy technical installations, was difficult. A later concept was “self-projection”, projecting photos of the surroundings back onto itself, creating a barely recognisable reinforcement of the pre-existing environment, or to project this onto semi-transparent surfaces placed in front of the object, thus creating a spatial distortion.

The first important switch occurred when moving from distant work with representative media (sketches, visualisations and computer models), imagining the site from plans and photos, towards testing models and working together in an on-site workshop with real materials. Changing media from digital to physical modelling, from scaled-down models on the screen to 1:1 mock-ups on the site, turned out to be a useful shift in the direction of the project. The initial ideas were translated into realisable solutions. Some ideas, such as projection, were abandoned because of the difficulties they involved (costs, difficulties with daylight projection, and removing the fan noise from the projectors).

A second important switch occurred when moving from individual to collaborative mode, and then back towards a more individual phase of design, and simultaneously switching from physical experiments back to modelling in 3D software. The move from a large collaborative group to two individuals helped to synthesize the project, and eliminated the need for coordination and the related lack of intensity. A design project is not democratic in the sense that good solutions come from involving everybody in the decisions. This coincides with the view of Gehri and Kaiser that a strong need for coordination affects the intensity of a project. A similar observation has been made about system architecture. The “synthesizers” and decision-makers are most often one individual or a small group who have

a holistic view of the project and who are able to see the bigger picture and take all of the parameters into account (Sage & Armstrong, 2000; Størdal, 2003).

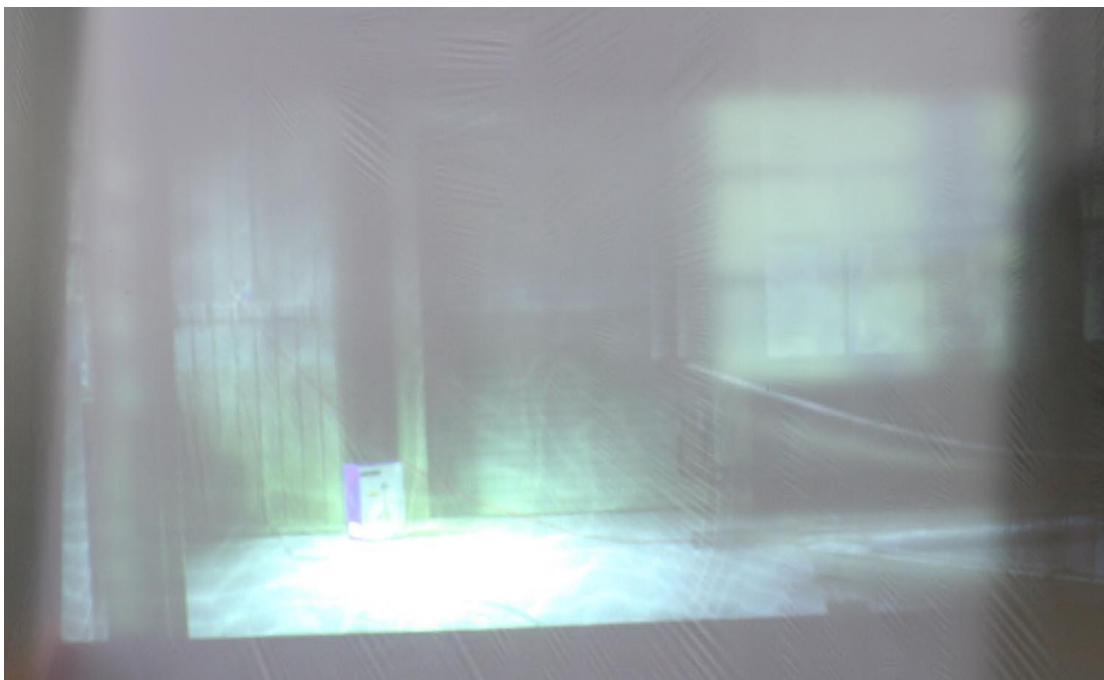
In this switch, all the metaphors that we had been using to describe the effects we wished to produce were dumped, and we moved towards spatial structural solutions. This enabled us to understand the *Barely* phenomenon as something generated from material and sound effects and configurations rather than from content-driven ideas. We began to describe the effects instead of working with textual associations. These different stages can be followed in the below selection of visualisations from throughout the design process.



First stage before first switch: Early visions of *Barely*: the “Predator effect” (from the *Predator* movies) here shown as a distortion of an image from a temple in Taipei. Media used to communicate intentions.



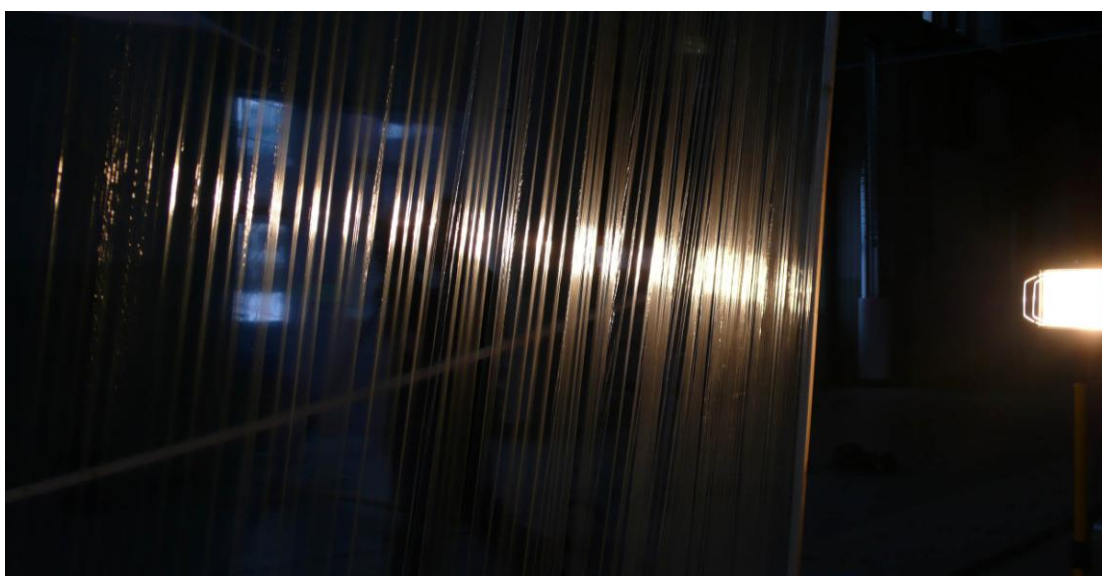
First stage during first switch: Early interpretations of *Barely*. The temple image as a backdrop with Eliasson's fog installation as an indicator of ambience. Used as title image for funding application. The fog effect was one idea used in the attempts to create the predator effect.



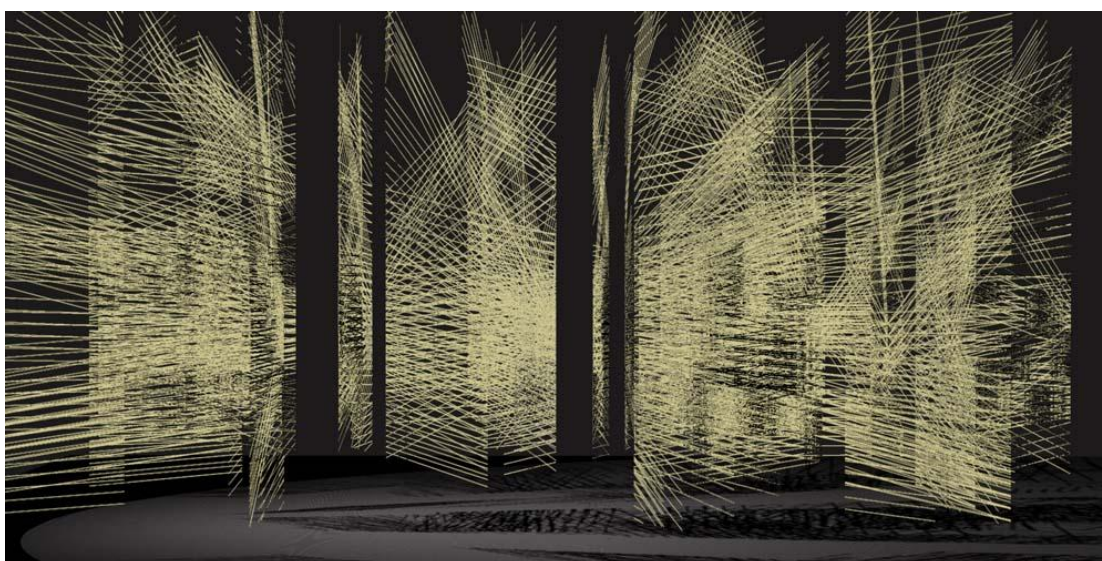
After the first switch: From the workshop. Experiments with semi-transparent foils and self-projection. (Projection of the surroundings onto the membrane so that it matches or co-relates to itself.)



Before second switch: Example of the interrelated spatial depths created by the projections. The conceptions move towards material and spatial effects.



Before second switch: During post-rationalisation, the workshop, material, and spatial effects became ever more important.



After second switch: Computer rendering of early ideas about a spatial line-based concept.

The first change to our concept was a move away from projections and continuous surfaces towards a concept that was highly spatial, but still very simple and cheap to produce. This development was partly driven by the intention to use the most spatial effects and elements tested in the workshop along with some of the patterning effects. The move was also driven by the technical problems associated with working with projectors in daylight-lit spaces and of masking the fan sounds from projectors. It was further motivated by the costs of using projectors. So this switch was driven by formal / spatial intentions, social regrouping, technological and funding parameters, as well as moving out of the venue and back to the computer. The selected solution was built of 20 polycarbonate sheets with painted UV-reflective lines and 20 black lights. The sound system consists of a loudspeaker orchestra with 6 peripheral speakers, 6 that were grouped within the space and 40 small speakers attached to the polycarbonate sheets.

The end result was a highly spatial and dynamic installation. This was not achieved by testing the effect of singular elements, such as specific sounds, lighting conditions, or spatial constellations, but by constructing a very complex experience that included the pre-existing complex environment. It specifically involved the change of daylight at dusk, when the spatial elements were transformed from very subtle and hardly recognisable to quite dominant.

The Installation as a Rich Research Space

If we regard the installation as a research experiment, it is very different to traditional research experiment, namely, a reduction of conditions to test and the watertight isolation of those conditions against external disturbances (bias). The *Barely* experiment tested a myriad of visual, audio, and spatial effects in a setting where the environmental surroundings were allowed to play an influential role. The question now is what kind of knowledge can be derived from this experiment? Clearly, the complex research design prevents the finding of unambiguous prescriptions and cause-effect-based conclusions; but this was never the intention. Rather, *Barely* was based on the idea that a certain complex interplay of environmental conditions would increase the level of awareness. The effect we were seeking was not produced by a singular stimulus, but by the magnitude and combination of stimuli. The very complex soundscape was matched with the very complex spatial installation. There are a few assumptions buried in this. Firstly, certain complex but low volume sound constellations would be more likely to attract the attention of the listener. Similarly, a very complex, transparent, and rich but subtle space induces more perceptual attention than a less complex but “louder” space. Although we were looking at “meditative” spaces, the purpose was not to make the audience turn attention inwards, but rather that their perceptual attention would be increased. The problems arise when we want to collect, analyse, and understand the effects. Instead of depending on information from the users, our main method of data collection was observation of behaviour. We had a pretty well defined set of criteria that would indicate success. If the audience fell into the imagined mode of silent and aware behaviour, and engaged in active perception, then the experiment was successful. I anticipated that we would have to give the audience prompts to guide them across the initial barriers and initiate a state of awareness. However, this turned out to be unnecessary. The behaviour change of the audience upon entering the installation was so remarkable that any doubt about the effects of our solution disappeared. The audience reacted just the way we intended and much more so than anticipated.

The specific singular features that contributed to the effect are not easily defined and compiled into a formula that could be used to repeat the effect. The effect was a result of the whole rather than the separate contributions of singular effects. The spatial features were transparent, complex, but minimalistic; a monotone space similar to a forest. It was also about fluency and inhabitation, the combination of spaces to dwell within combined with a lack of

clearly defined territories. Further, the dynamic but very slow change of the space at dusk was also of importance. The soundscape was very particular and central and one could say that the sound and the physical installation were interdependent. It is important to understand that these effects would only partially be achieved with the elements separated from each other.

Summary and Conclusion

The main aim of this paper was to introduce the Rich Research Space as a radical framework for research-by-design. The Rich Research Space is a tool to cope with very complex problems and respond to them with creative and artistic intensity. It is a tool for intensified research-by-design with the aim of developing new design solutions. It is a framework for collaboration, synthesis, and decision making. It is a tool for reflection and analysis, and for making research results explicit. The Rich Research Space can only be learned by practicing it. The approach focuses on design and research skills rather than prescriptive methodologies.

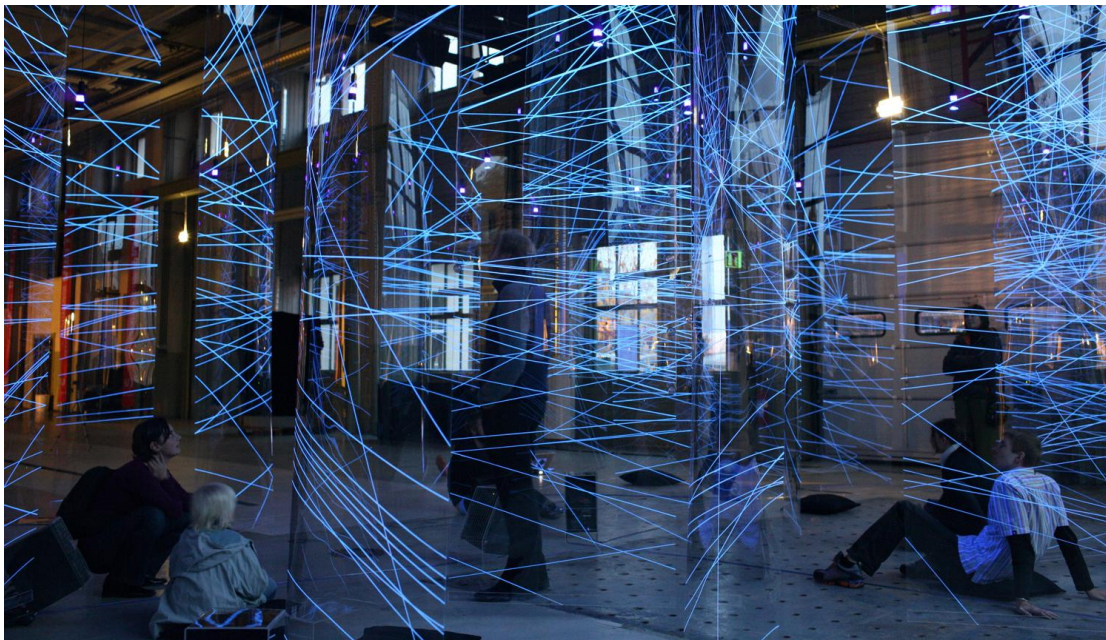
The case study presented investigated an environment with very low sensory input and demonstrated how this would influence audience behaviour. The concept for *Barely* was based on an effect that resulted from a combination of several factors, sound space, physical space, and the interplay of the environment with the installation. This multiple effect was impossible to create or investigate in a fragmented manner. Public urban spaces are filled with these combined effects and they can only be investigated in a non-reductive way. The Rich Research Space allows for the complexity and richness on which these phenomena are based. It is inclusive and flexible and contributes to new thinking, and new concepts and methods for research-by-design. The *Barely* experiment demonstrates how research-by-design heuristically and generative creates new knowledge that is on the level of basic research. In the process of making the installation, we explored how the “barely perceptible” could influence the behavioural patterns of visitors. This was done by creating a Rich Research Space where different effects, manifestations, and interpretations were explored by varying groups of participants through different stages. The Rich Research Space changed or switched at several points, and these switches accelerated the project in new directions. The selection and development of one solution is not computable but is decided using partly intuitive synthesis. This decision was made by two of the participating group members. The Rich Research Space promotes dynamic flexibility. It therefore allows for the group dynamics needed to avoid the problems of co-ordination and maintain artistic intensity. This is achieved by allowing parallel tracks over longer periods and by allowing switches in the constellation of the group involved. At synthesizing moments, the group is reduced to the decision makers. In the *Barely* case, this was the project leaders. Greater awareness of these mechanisms of responsibility in collaborative groups will allow other individuals to arrive at synthesized solutions. The decision making is the result of the synthesis of many aspects. These include material, social, and cultural issues. The synthesis created a new effect that had a substantial influence on visitor’s behaviour and added directly to design knowledge.

The project is a good example of research-by-design that is situated in design practice. The project, in addition to its material results, needs a systematic reflexive dimension to become a fully-fledged research-by-design project. This dimension was created prior to, during, and after the element that is defined as the design project. Before, through the documentation of the concept and the intentions; during, through reflection; and after, in the reflections about and conclusions resulting in the publication of the findings in scientific journals. The *Barely* project will have a second setup in November 2008 and the research findings will be summarized following that showing. There is potential for the implementation of the *Barely* concept in public spaces.

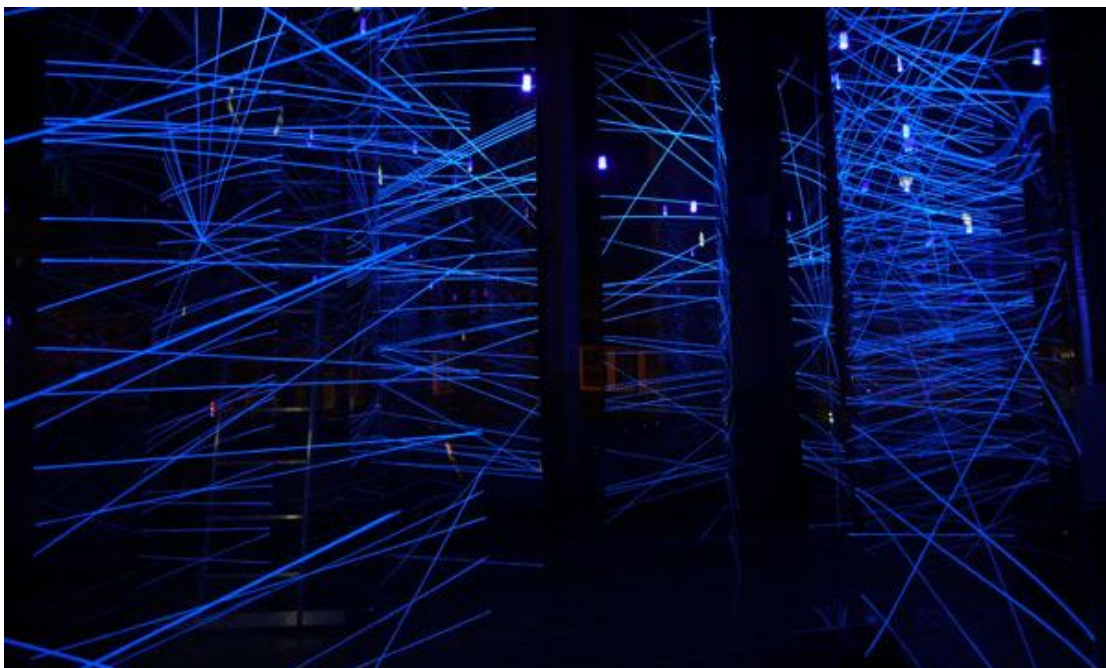
The concept of the Rich Research Space needs further elaboration. Developing it as a genre and a research skill could be a beneficial means of maintaining considerable levels of critical

distance. The most important contribution of this approach is its provision of a non-dogmatic and flexible framework. This framework can be used as a starting point for further developments within research-by-design.

The concept of the Rich Research Space is an attempt to cope with and respond to the challenges to design and research in an increasingly complex world. It is necessary for designers to respond to the complex problems we face in a more advanced way without losing their artistic or design intensity or integrity. If we are able to find more valid ways of operation that go beyond service to profit-making, the designer, with her specific skills, can play a crucial role. The Rich Research Space provides a means of increasing this sensibility towards the complex, by extending our capabilities to cope with it, and by growing the skill to respond to it in creative and critical ways.



Observation of audience behaviour during opening hours of the installation (Photo Kim B. Larsen)



Installation in late evening

Thanks to all the people who commented this paper in the making.

Credits

Barely, 2007

Sound and Space Installation, Kanonhallen, Oslo 30th September - 14th October

Commissioned by Ultima Festivalen 2007

Composition and Sound Design: Natasha Barrett

Project Leader: Birger Sevaldson

Project Team: Natasha Barrett, Daniel Coll i Capdevila, Andrea Di Stefano, Michael Hensel, Aleksandra Jaeschke, Birger Sevaldson, Defne Sunguroğlu, with Kim Baumann Larsen

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